Mt Piper Power Station Extension

ENVIRONMENTAL ASSESSMENT

CHAPTER 2 – STRATEGIC JUSTIFICATION

- September 2009

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2. Strategic Justification

The Director-General's requirements:

- *Include a strategic assessment of the need, scale, scope and location for the project in relation to predicted electricity demand, transmission constraints and the strategic direction of the region and the State in relation to electricity supply, demand and electricity generation technologies;*
- *Include an analysis of site suitability with respect to potential land use conflicts with existing and future land uses (including existing and approved rural-residential development and mineral reserves) taking into account local and strategic land use objectives; and*
- *Describe alternatives considered for the project in particular technology and configuration including fuel source, air emission, water use and provide justification for the project demonstrating its benefits at a local and strategic scale in comparison to alternatives considered, including the do nothing option.*

2.1 Energy and Electricity Demand and Production

2.1.1 Energy Use

The Australian Bureau of Agricultural and Resource Economics (ABARE) indicates that primary energy use, that is consumption of all forms of energy, in Australia grew by an average of 2.0–2.3 per cent per year over the last thirty years (Cuevas-Cubria and Riwoe 2006). This was expected to moderate over the medium term before falling to an average of 1.5 per cent up to 2030, representing an overall increase of 46 per cent.

The projections by state are presented in **Table 2-1** (Cuevas-Cubria and Riwoe 2006). The values for energy consumption reflect industry activity for energy intensive sectors and gross state product in the case of the non energy intensive sectors. The national per capita primary energy consumption for 2004-05 was 275 gigajoules (equivalent to 0.08 GWh). For NSW, the primary energy consumption for 2004-05 is equivalent to 217 gigajoules per person (equivalent to 0.06 GWh). The total primary energy consumption from 2004-05 to 2029-30 is projected to rise at a rate in excess of population growth during this period.

▪ **Table 2-1 Projected Primary Energy Consumption in Australia by State**

State / Territory	Consumption (PJ)				Average Annual Growth (%)	
	2004-05	2010-11	2019-20	2029-30	2004-05 to 2010-11	2004-05 to 2029-30
New South Wales & Australian Capital Territory	1531	1661	1819	1984	1.4	1.0
Victoria	1452	1552	1688	1823	1.1	0.9
Queensland	1319	1518	1886	2265	2.4	2.2
Western Australia	760	965	1196	1385	4.1	2.4
South Australia	333	350	357	383	0.8	0.6
Tasmania	118	129	135	143	1.5	0.8
Northern Territory	80	137	147	180	9.3	3.3
TOTAL	*5593*	*6311*	*7228*	*9162*	*2.0 (ave)*	*1.5 (ave)*

Source: Cuevas-Cubria and Riwoe 2006, Table 9.

2.1.2 Electricity Supply and Demand in NSW

The National Electricity Market (NEM) provides a wholesale market for the supply of electricity to retailers and end-users in NSW, Victoria, Queensland, South Australia, Tasmania and the Australian Capital Territory (Owen 2007). Energy needs can be satisfied by energy supplied from scheduled, semi-scheduled and/or non-scheduled power stations. Scheduled energy is the portion of energy supplied that is dispatched by AEMO as part of the operation of the NEM. Semi-scheduled is large wind farms. Non-scheduled energy is the portion of energy that is usually connected to distribution networks or ‘embedded’ within consumer premises and includes smaller wind farms. In 2005-06, 97.4 per cent of NSW’s energy was supplied from primarily coal-fired scheduled generators.

The NSW Government’s *Inquiry to Electricity Supply in NSW*, also known as the Owen Inquiry, examined the future of electricity generation in NSW and provided advice to the Government on the actions necessary for a timely investment in new baseload generation (Owen 2007).

The growth of the electrical energy use in NSW is very dependent on the growth rates forecast for the economy and the continued increase in population. The population of NSW is just under 7 million and is predicted to grow to 7.6 million by 2018 (NSW Treasury, 2008). Associated with population growth is higher economic growth which results in higher energy consumption. The Owen Inquiry indicated that electricity demand over the last 20 years has grown more than 4% per year and has doubled over the last two decades. The Inquiry also noted that electrical consumption in NSW has grown by 1,700 GWh per year for the past 30 years. The average growth rate for the next 10 years is expected to be around 1,600 GWh per year, factoring in demand management trends.

Owen indicated that, assuming all generators are consistently running to maximum technical capacity factor limits, NSW generators are capable of delivering about 85,000 GWh of energy per year. The contribution of non-scheduled generators is projected to increase from 2000 to 4000 GWh per annum by 2016-17. It was acknowledged that renewable energy supplies will become increasingly important, with gas generation embedded in distribution or customer networks possibly contributing another 50 GWh per year. Owen concluded that NSW needs to be prepared for new baseload generation from 2013/2014 to meet growing demand and to avoid energy shortfalls and it was forecast in 2007 that 85,000 GWh of electrical energy would be needed in NSW by 2013/2014 under a medium growth scenario and by 2016/2017 under a low growth one.

More recently the TransGrid 2009 Annual Planning Report indicated that, under medium growth (using low forecasts due to the Global Financial Crisis) 85,000 GWh would be in demand by 2014/2015.

The 2009 Electricity Statement of Opportunities (ESOO) published by the Australian Energy Market Operator (AEMO)[1] indicates that additional capacity of 182 MW is required in NSW in 2015/16 based on its demand/supply forecasts. This is the first year that the LRC[2] indicates a reserve deficit[3] as indicated in Figure 2.3 of the ESOO (see **Figure 2-1)** showing the NSW summer supply-demand outlook. As can be seen the reserve deficit increases to about 625 MW in 2016/17 and about 1,050 MW in 2017/18.

The first LRC point occurs one year later than that reported in the 2008 ESOO[4]. As indicated in the ESOO[5], TransGrid provided the annual energy forecasts for NSW which are consistent with those in its APR. According to the 2009 ESOO, TransGrid advised that the difference between the projections was due, among other things to "a severe worsening in the economic outlook, resulting in lower forecast economic activity throughout the forecast period"[6]. AEMO advises that "The

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[1] AEMO commenced operations on 1 July 2009 following the merger of the National Electricity Market Management Company (NEMMCO), VENCorp and a number of other regulators.

[2] LRC stands for "Low Reserve Condition" which occurs "when AEMO considers that a region's reserve margin (calculated under 10% probability of exceedance (POE) scheduled and semi-scheduled maximum demand (MD) conditions) for the period being assessed is below the minimum reserve level (MRL)". See page 9 of Glossary of 2009 ESOO.

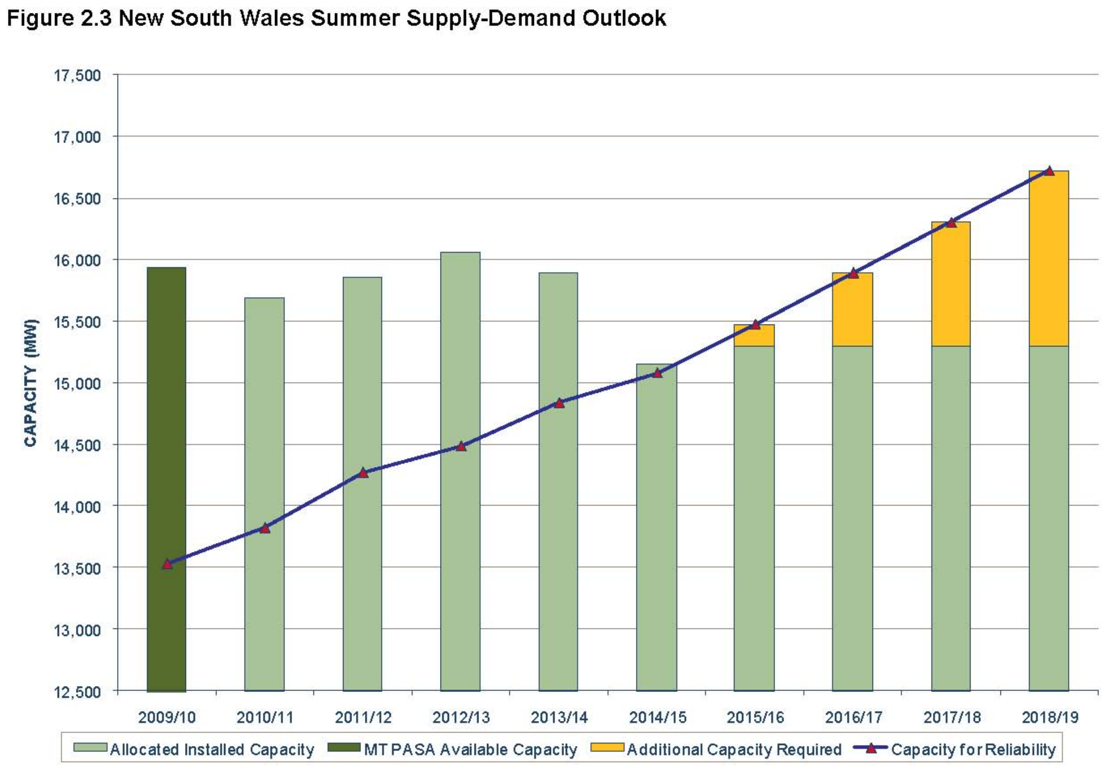
[3] Reserve deficit means "The amount by which a region's reserve margin falls below its (specified) minimum reserve level (MRL)". See page 16 of Glossary of 2009 ESOO

[4] 2009 ESOO, Page 2-9

[5] 2009 ESOO, Page 3-6

[6] 2009 ESOO, page 3-6

different economic scenarios and resulting energy projections demonstrate that higher economic growth causes higher energy consumption. As a result, it is prudent to consider economic forecasts underpinning the projections when investigating their applicability, particularly the more recent projections of Federal Government GDP and New South Wales Government GSP"[7].



- ***Figure 2-1 NSW Summer Demand Outlook (from ESOO 2009)***

These words of caution by AEMO are particularly relevant given the long lead times in developing new base load generation. For example, given the recent upturn in the Australian economy and indications that the world is emerging from the global financial crisis, it could be postulated that electricity projections could return to levels indicated in the 2008 ESOO. This could advance the need for new base load generation.

[7] 2009 ESOO, page 3-5

Notwithstanding such an improvement in economic activity, as indicated above, the 2009 ESOO shows the need for new generation capacity over the next five to seven years[8] and beyond. This is about the lead time for new base load generation given:

- One to two years lead time to complete the sale of the Mt Piper Extension development site and for the new owner to arrange the necessary finance, prepare the specifications, obtain the necessary approvals, and call tenders and award contracts for the design, manufacturing and construction of the power station.
- Four and a half to five years for the construction and commissioning of coal-fired plant (if this option was chosen).

The NEM facilitates flow of power from States with spare capacity to those that need more capacity. According to the Owen Inquiry, during peak periods demand exceeds the State's domestic supply. To meet this peak demand, NSW is required to gain access to electricity from other interconnected regions in the NEM. In 2006-07, interregional supplies from the Snowy Region and Queensland contributed approximately 9,000 GWh to NSW, which is over 10 per cent of NSW needs. Reserve capacity support from the Snowy region and Queensland can provide additional available capacity from 2006/07 until 2009/10. Beyond 2010/11 it is possible that NSW will not be in a position to obtain additional capacity from the Queensland or the Snowy region as Queensland, Victoria and South Australia may be experiencing deficits.

2.1.3 Strategic Direction

Electricity demand depends on economic growth (notwithstanding implementation of demand management) and, although estimates of demand vary, it is clear that we will reach the limit of existing baseload capacity within the next 5-7 years.

The NSW State Plan (2006, updated 2008) has set two relevant priorities:

- P2 - Maintain and invest in infrastructure. This is intended to ensure the right infrastructure, including power, is available at the right time.
- E2 - A reliable electricity supply with increased use of renewable energy. The plan identifies a target of electricity reliability for NSW of 99.98% by 2016 and the provision of new baseload power will contribute to achieving the required reliability.

Renewable energy consumption in NSW has been maintained at about 6% of the overall electricity consumption. In order to increase the amount of renewable electricity consumed the NSW Government established a target of 15% renewable energy consumption by 2020 and the

[8] Counting from the end of 2009, start of 2010.

Commonwealth has recently legislated for the national scheme which will provide incentives for renewable energy generation (Renewable Energy Target - RET) of 20% by 2020 and is proposing the implementation of the Carbon Pollution Reduction Scheme (CPRS). The NSW Energy Reform Strategy of March 2009 noted that renewable fuels and gas are anticipated to increase their share of total generation capacity with the introduction of the RET and the CPRS but that coal fired generators will still be expected to play a crucial role in both the NEM and in NSW.

Measures to support renewable energy generation resulting in reductions in emissions include the introduction of technologically efficient baseload generation which, when driven by a market based approach to the price of carbon, will allow the easing out of less efficient, older baseload technologies. In particular, the NSW Energy Reform Strategy of March 2009 was designed to support the development of facilities to increase baseload power generation, and with that the prospect of carbon pollution pricing will make gas an increasingly attractive fuel source for future baseload generation.

The main factors in determining the need for the proposal are to:

- Supply additional baseload generation capacity using best commercially available technology, incorporating appropriate abatement technologies where needed, to meet future energy demand requirements;
- Provide a long-term energy solution, recognising that the demand is projected to continue to increase over the next 10-20 years at the least;
- Provide electricity supply in a cost effective manner; and
- Consider the community and environmental impacts of increasing power supply.

2.2 Alternatives for Baseload Power Generation Technology

The characteristics and resource availability of generation technologies, and their potential for baseload supply, are discussed below.

2.2.1 Coal and Gas Alternatives

The Owen Inquiry (Owen 2007) concluded that “the most technologically advanced, commercially viable options currently available for the next tranche of base load generation in NSW are Combined Cycle Gas Turbine (CCGT) and Ultra-supercritical Coal (USC).”

Combined Cycle Gas Turbines

CCGT technology involves converting gas to electricity via a gas combustion turbine and utilising the waste heat from this process to generation additional power from a steam turbine. The technology is commercially available and well proven. It is the most efficient fossil fuel based generation technology commercially available, with efficiency exceeding 50 per cent in the newest models.

While CCGTs are significantly cheaper to build than coal-fired generators, they have higher fuel costs, and it is this that most limits their attractiveness for baseload power. NSW has limited indigenous gas reserves and a large baseload CCGT would rely on gas supplies via pipeline from Queensland, South Australia and/or Victoria.

Supercritical and Ultra-Supercritical Coal

Supercritical (SC) and USC power plants operate at temperatures and pressures above the critical point (World Coal Institute).[9] This results in higher efficiencies[10] (up to 42% for SC and 46% for USC depending on local climatic conditions and other factors) and lower emissions than traditional coal-fired plant.

USC[11] technology is well proven and is currently the most efficient coal-based power technology commercially available. USC power stations are able to run at high efficiency and capacity factors and generate large amounts of electricity.

NSW's large reserves of low cost coal resources would provide a low cost, reliable fuel supply to a proven and mature coal fired generating technology. This technology is able to deliver reliable, low cost, baseload supply compared with other commercially available technologies.

Cooling Options

There are three main technologies utilised for cooling:

- Once through cooling;
- Wet natural draft cooling towers; and
- Dry air cooled condensers.

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[9] *Critical point describes the temperature and pressure above which the working fluid – in this case water – no longer turns into steam but instead decreases in density when it is heated above 'boiling point'. By eliminating this transition into steam (phase change) the efficiency of the process can be improved.*

[10] *Calculated on a Higher Heating Value, net basis*

[11] *Though there is no formal definition for USC, USC plants operates at higher temperature and pressure than SC technology, so giving higher efficiency though at increased capital cost.*

Once through cooling requires large flows of water to reject heat, such as an ocean, lake or river. The resulting increase in temperature of the body of water used for cooling can have adverse environmental impacts and such bodies of water are not available at Mt Piper.

Wet natural draft cooling towers are employed at the existing Mt Piper Power Station and use the cooling effect of evaporating water. Cooling towers require large quantities of water and it would not be environmentally possible to provide water for main cooling towers at the proposed Mt Piper Power Station Extension.

The proposed technology for the Mt Piper Power Station Extension is dry air cooled condensers. Heat is rejected to the atmosphere and air cooling has the advantage of requiring no water. The disadvantage of air cooling is the lower efficiency compared to cooling towers or once through cooling.

Emission Control Options

The key emissions to air which affect the air quality are the sulphur dioxide (SOx), nitrogen oxide (NOx) and particulates (PM_{10}). The type of fuel used will affect all of the above emissions. Likely coal and gas sources are discussed in Chapter 3.

For coal NO_X emission level of less than 500mg/Nm^3 would be achievable and this assumption was modelled in the air quality assessment. As described in Chapter 9 the impacts associated with this would be acceptable and there would be no requirement for NOx reducing measures. Progressive advances have been made in the design of primary NO_X reducing measures such that today, low NO_X burners can provide NO_X levels down to 350mg/Nm^3 (at 6% O_2 - dry volume basis). For the gas option NOx emission controls were assumed to meet the requirement of 70 mg/ Nm^3.

Given that the emission limit for PM_{10} is likely to be set at 50mg/Nm^3 a bag filter would be required to ensure compliance. This was assumed in the modelling undertaken for both gas and coal options.

The SO_X emission rate is solely dependent on the level of sulphur in the coal. For the sulphur in the coal supplied to Mt Piper in the year 2003, namely 0.78% dry ash free basis, the level in the flue gas is approximately 1100 mg/Nm^3. No SOx controls would be required.

Carbon Capture and Storage

Provision will be made in the site layout for the construction of carbon capture plant at the site. When coal or natural gas is burned for power generation, an exhaust (flue) gas stream comprising mainly nitrogen, carbon dioxide, water vapour and oxygen is produced. Typically, the CO_2 concentration of the flue gas is about 15% (v/v) and for a large coal fired power plant the flue gas production rate would be high. The CO_2 would need to be isolated from other gases and transported to the designated storage area for long term isolation from the atmosphere. The removal of CO_2 from the flue gas stream would require a substantial investment in equipment and large amounts of energy.

There are three generic types of CO_2-capture systems demonstrated or proposed for fossil fuel fired power plants (Connell Wagner, 2007), namely:

- Post-combustion, involving capture of CO_2 from all or part of the flue gas stream. A number of technologies are available, some of which are used commercially for the separation of CO_2 from natural gas;
- Oxy-fuel combustion, which entails burning the fuel in high purity oxygen. This results in high CO_2 concentrations in the flue gas stream and therefore easier separation;
- Pre-combustion, which involves the separation of hydrogen and carbon dioxide prior to combustion. It is only suitable for IGCC generation technology.

Once separated from other gases and compressed the CO_2 can be transported to the site of storage by pipelines, road, ship or rail.

Options for the long term isolation of CO_2 from the atmosphere include storage in deep geological formations, deep ocean storage or reaction with metal oxides to convert the CO_2 into a mineral such as a metal carbonate. Little is known about the potential for geo-sequestration in NSW but studies are being undertaken by generators to assess the potential.

Waste Options (Ash)

A separate assessment is being undertaken by Delta to identify and secure ash storage areas for the future for the existing Mt Piper Power Station and for the proposed Mt Piper Power Station Extension. An application is to be lodged shortly with Department of Planning for the consideration of ash storage at a number of sites in the vicinity of the existing Mt Piper Power Station that would be shared by the existing power station and the proposed Mt Piper Extension.

Several options exist for the placement of ash from the coal fired plant option, including:

- Stage 1 ash storage area – currently used by existing Mt Piper Power Station and would be filled by the time the new power station was operational;
- Stage 2 ash storage area – adjacent to Stage 1 but yet to be developed, extending into coal mining areas known as Lamberts Gully. These areas are being mined at present and would be available for ash placement within the time frame of the proposed coal fired plant;
- Potential ash storage areas around Neubecks Creek and to the south west of the existing plant. These areas could be used in the longer term, subject to a decision and approval for them to be mined;

- A substantial increase in the amount of ash that can be reused. The existing plant sells up to 15-20% of the ash produced. The assessment for the new ash storage areas would examine further options for reuse.

2.2.2 Alternatives for Baseload Electricity Options

Advanced Coal – Integrated Gasification Combined Cycle

Integrated Gasification Combined Cycle (IGCC) is an emerging technology which may be capable of improving efficiency and emission performance of coal-fired generation. IGCC converts coal to a gaseous fuel through partial oxidation, which is then used in a CCGT. The technology could be effectively adapted for carbon capture in the future if necessary.

IGCC technology is currently in its demonstration phase, and is regarded as a possible contributor to NSW baseload electricity beyond 2020 (Owen 2007). At this time, IGCC is not considered a commercial baseload option.

Hydro

Hydro generation is important to meeting NSW's peak power demand. However, the capacity of 'run of river' hydro generators is limited by the availability of water and area for construction of new dams (Owen 2007). Baseload generation is required for pumped storage hydro power, which is not totally recoverable. Therefore, new hydro-generation is not considered a viable option to meet future baseload needs.

Renewable Energy

Renewable energy for baseload is limited due to either scarcity of viable energy resources in the case of hydro and biomass, or intermittent nature of supply in relation to wind, solar photovoltaic (PV) and solar thermal.

The ability of wind generation to provide reliable base load generation is primarily constrained by the variability of the wind resource to produce consistent and stable wind farm output. Most of the time a wind turbine would operate at less than its full rated power, with a typical annual capacity factor of 30-35% in NSW. Operating or approved wind farms in NSW have a generating capacity of about 1,200 MW (Connell Wagner, 2007), although the variability of wind limits the ability of a particular wind farm to generate power as and when required for base load generation. Connell Wagner (2007) estimated that "firm" power for wind farms in NSW would probably be less than 5% of installed capacity, although as the amount of installed capacity increases this percentage would increase. In any case, the base load capability of wind farms in NSW would be low.

Solar thermal technology transfers heat generated from solar radiation to a working fluid (e.g. water) or a heat engine (Owen 2007). Solar thermal plant has some of the characteristics attributed to base load plant, the most important being low marginal cost. The ability to operate at high capacity factors is not possible unless it is coupled with an energy storage system or in concert with a power plant that can operate when solar energy is not available. The technology is still at an early stage of development and further research is required to make it cost-effective, although solar thermal technology has the potential to make a significant contribution to the production of electricity due to the wide spread solar resource with further development of the systems, energy storage and cost reductions.

Geothermal (Hot Dry Rock (HDR)) energy extracts heat from underground rocks which is converted into electricity in a power plant, similar to a conventional steam driven plant (Owen 2007). The technology would not be suitable to supply base load power in NSW as it has not yet reached the stage of development that would be necessary for large investment as a base load generator. There are no proven HDR resources in NSW and the potential for geothermal sources is currently limited by the status of technology development and remoteness from load centres of known large scale geothermal resources.

Biomass, being different types of organic energy (e.g. forestry and agricultural wastes, food processing wastes, sewage and energy crops) is generally burnt in conventional, low stress boiler designs (Owen 2007). Biomass plants are considered to be most successful where the biomass is derived from another production process, reducing transportation costs. The main impediment to using biomass for base load in NSW is related to the cost of transporting fuel to a central site which then results in limiting the scale of the plant if the fuel is to be kept at a reasonable price (Connell Wagner, 2007).

Solar PV is not yet available as a large scale commercial technology. The largest demonstration solar PV farms are of the order of 50 MW with capacity factors generally less than 20%.

2.2.3 Selection of Location

Delta Electricity had two broad options for locating a new 2,000 MW base load power station: develop a new greenfield site or extend one of their existing power stations.

New Greenfield Site

Opportunities for new large scale power station sites are limited to sites outside the area of influence of the Sydney air shed (see below). Such new sites would be regarded as of less value than the expansion adjacent to an existing site due to the loss of opportunities to utilise existing infrastructure and the creation of an extended area of impact compared with consolidating any impacts into one area.

Extending or Upgrading Existing Delta Electricity Power Stations

Delta Electricity operates four major power stations in NSW:

- Vales Point Power Station;
- Munmorah Power Station;
- Mt Piper Power Station; and
- Wallerawang Power Station.

Vales Point and Munmorah Power Stations are located within five kilometres of each other on the NSW Central Coast. The installation of new capacity by 2,000 MW adjacent to these stations would not be favoured due to the growing urban population in the area, although the smaller scale extension proposed separately at Munmorah would be more suitable for the site.

Interregional air pollution modelling studies undertaken have shown that on a number of occasions each year, air pollution from the Hunter Valley and Central Coast power stations could impact upon Sydney basin air quality. Inter-regional transport (into the Sydney airshed) from the Lithgow based plants is less likely to occur and this is demonstrated in Chapter 9.

The original designs for the existing Mt Piper Power Station and ancillary infrastructure allowed for a doubling of generating capacity. Construction of the new generators in a new power station adjacent to the existing power station has significant benefits in terms of sharing existing external infrastructure (water supply, coal supply and transmission), and some internal infrastructure (ash storage and waste water treatment) where appropriate.

2.2.4 Suitability of the preferred site

Land use

Delta Electricity owns the land required for the project. The location of the preferred site and key geographic features are shown in **Figure 2-1**.

The site occupied by the existing Mt Piper Power Station and owned by Delta Electricity is generally surrounded by State forests, extractive industries (mining) and power generation facilities. Ben Bullen State Forest is located north east and south east of the Mt Piper Power Station. The Wallerawang Power Station is located approximately 6 km to the south-east. The nearest townships are Portland, which is approximately 4 km to the west of the site, and Wallerawang, which is approximately 6 km to the south-east of the site. There are also several communities in the vicinity of the power station, including Blackmans Flat, which is approximately 3 km to the south-east, Lidsdale, which is approximately 6 km to the south-east, Cullen Bullen, which is approximately 6 km to the north of the site and rural residential properties in Back Cullen Road, which are approximately 3 km to the west of the site.

Zoning and future land use

The proposed development is located within the City of Lithgow local government area and is subject to the provisions of the Lithgow City Local Environmental Plan (LEP) 1994. The development site is zoned Rural (General) 1 (a) and the proposal is permissible with consent in this zone. The LEP indicates that this zone provides flexibility while protecting rural lands and other uses are permitted, where appropriate, including certain industrial development.

The importance of Mt Piper Power Station as a State asset is acknowledged in Lithgow Council's Strategic Plan (2007) in that the site needs to be protected from potentially conflicting land uses. Given this commitment and the land uses in the immediate vicinity of the proposal, there is no likelihood of the proposal being subject to development inconsistent with the current land use on the boundaries affecting the primary agricultural purpose of the zoning. There are no proposals before Council to change the status of the zoning of adjacent lands and it is unlikely that any changes in land use or zoning may occur in the areas adjacent to the project site.

This preferred site is most suitable for the proposed development in that:

- There will be no change in land use – it will be located next to the existing Power Station;
- The land uses in areas adjacent to the preferred site are unlikely to change in the future from the existing usage, nor would development densities in populated areas nearby be expected to change;
- The proposed use is consistent with other uses in the area, given that major land ownership on the property boundaries is by coal companies, suggesting a continuation of coal extraction as the main neighbouring usage; and
- The wider area comprises two power stations and many coal mines and associated infrastructure.

2.3 Transmission

TransGrid is currently constructing a 500 kV switchyard adjacent to the existing 330 kV switchyard at Mt Piper Power Station. This switchyard is due for commissioning over the next 12 months as part of the commissioning of TransGrid's Western 500 kV system. The proposed Mt Piper Extension will connect directly to the new 500 kV switchyard giving it strong access to the national grid. However, it is likely that it will face constraints under some conditions until the southern link, northern link or both missing links in the 500 kV ring main around Greater Sydney are built. TransGrid documentation indicates that one or both of these links will be built when demand and/or supply requires it. From a planning perspective, Mt Piper Extension should not be exposed to transmission constraints once one or both of the missing links of the 500 kV ringmain is built and this is likely to occur before the Mt Piper Extension is commissioned.

2.4 Project Justification

The key finding of the Owen Inquiry was that NSW needs to be prepared for new baseload generation from 2013-14 to meet growing demand and to avoid energy shortfalls. It was forecast that 88,000 GWh of electrical energy would be needed in NSW by 2013-14 and, to address this shortfall, preparation should start immediately. Revisions to population and economic forecasts suggest that the timing for this need has been delayed, but it is clear from all available data that substantial new base load generating capacity will be required in NSW within the next 5 to 7 years.

Coal and gas based technology are currently the most cost-efficient power technology commercially available. NSW's large reserves of low cost coal resources will provide a low cost, reliable fuel supply to a proven and mature coal fired generation technology, while gas turbine generators are a proven and well established technology for base load power generated by gas from South Australia, Victoria or Queensland. These technologies are best placed to deliver reliable, low cost, baseload supply over the long term. The failure to develop this new baseload generating capacity will place at risk the reliability of electricity supply in NSW.

The Mt Piper Power Station Extension (using either gas (CCGT) or coal (USC)) is considered to be a viable option to be implemented within the next 5-7 years to meet longer-term demands. This preferred site is suitable for the proposed development in that it is currently used for power generation.

A full justification of the project demonstrating benefits at a local and strategic level is provided in Chapter 15.